CALIFORNIA HIGH-SPEED TRAIN

Project Environmental Impact Report /

Environmental Impact Statement

Supplemental Alternatives Analysis Report

San Jose to Merced Section High-Speed Train Project EIR/EIS

July 2011

CALIFORNIA High-Speed Rail Authority

U.S. Department of Transportation
Federal Railroad Administration

California High-Speed Train Project

San Jose to Merced Section

SUPPLEMENTAL ALTERNATIVES ANALYSIS REPORT

July 2011

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Acronyms and Abbreviations

AA	Alternatives Analysis
BNSF	Burlington Northern Santa Fe
FA	Freeway Agreement
HST	High-Speed Train
POH	Preserve Our Heritage Organization
SR	State Route
UPRR	Union Pacific Railroad
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency

EXECUTIVE SUMMARY

ES.1 PROPOSAL FOR STATE ROUTE 152 HIGH-SPEED TRAIN ALIGNMENT

The United States Environmental Protection Agency (USEPA) and United States Army Corps of Engineers (USACE) have requested that the Authority continue to evaluate an HST alignment parallel to State Route 152 (SR-152) in the San Joaquin Valley.

In addition, Authority outreach in the San Joaquin Valley resulted in stakeholders submitting written letters and testifying at High-Speed Rail Authority meetings. Farmers and other stakeholders expressed concern about the impacts that the High-Speed Train (HST) alignment alternatives would have on agricultural land and agricultural business and a farming interest group called "Preserve Our Heritage" (POH) submitted to the Authority a proposal for a new alternative: an alignment paralleling SR-152 with a proposed new location for the wye with the Merced to Fresno Section.

ES.2 AUTHORITY RESPONSE

The Authority held several meetings with Caltrans District 6 staff to discuss the appropriate configuration of the proposed HST alignment in relation to possible future configurations of SR-152 and the currently approved freeway agreement between Madera County and Caltrans.

The Authority developed a SR-152 alignment to a conceptual level to be consistent with Caltrans planning, the SR-152 Freeway Agreement, and HST engineering criteria. Also, in order to respond to comments from the USACE, three possible wye configurations were developed at the conceptual engineering level to connect to each of the North/South routes under consideration by the Merced to Fresno Section. These include wye configurations from SR-152 to: (1) the A1 Alignment (BNSF), (2) the A2 Alignment (SR-99), and (3) the Hybrid alternative connecting the southern portion of A1 and the northern portion of A2 HST alignments. These three conceptual wye configurations are evaluated and compared in this Alternatives Analysis (AA), and they allow a connection to each of the North/South Merced to Fresno alignments. Figure ES-1 illustrates the wye configurations evaluated in this AA.

ES.3 RELATIONSHIP OF CONCEPTUAL PROPOSED AUTHORITY ALIGNMENTS TO SR-152

The SR-152 Freeway Agreement signed by Madera County and Caltrans identifies six locations for future interchanges with intermediate roads either separated with underpasses or closed. The HST alignment was offset approximately 400 feet from the freeway south right-of-way to the HST northern right-of-way line to accommodate the future planned improvements to SR-152. The preferred local interchange configuration for planning purposes is a Type L-9 partial cloverleaf (see Figure ES-2). The typical existing corridor land use is agricultural. The average agricultural parcel width adjacent to the SR-152 corridor is 1200 feet.

Figure ES-1. SR-152 Wye Alternatives

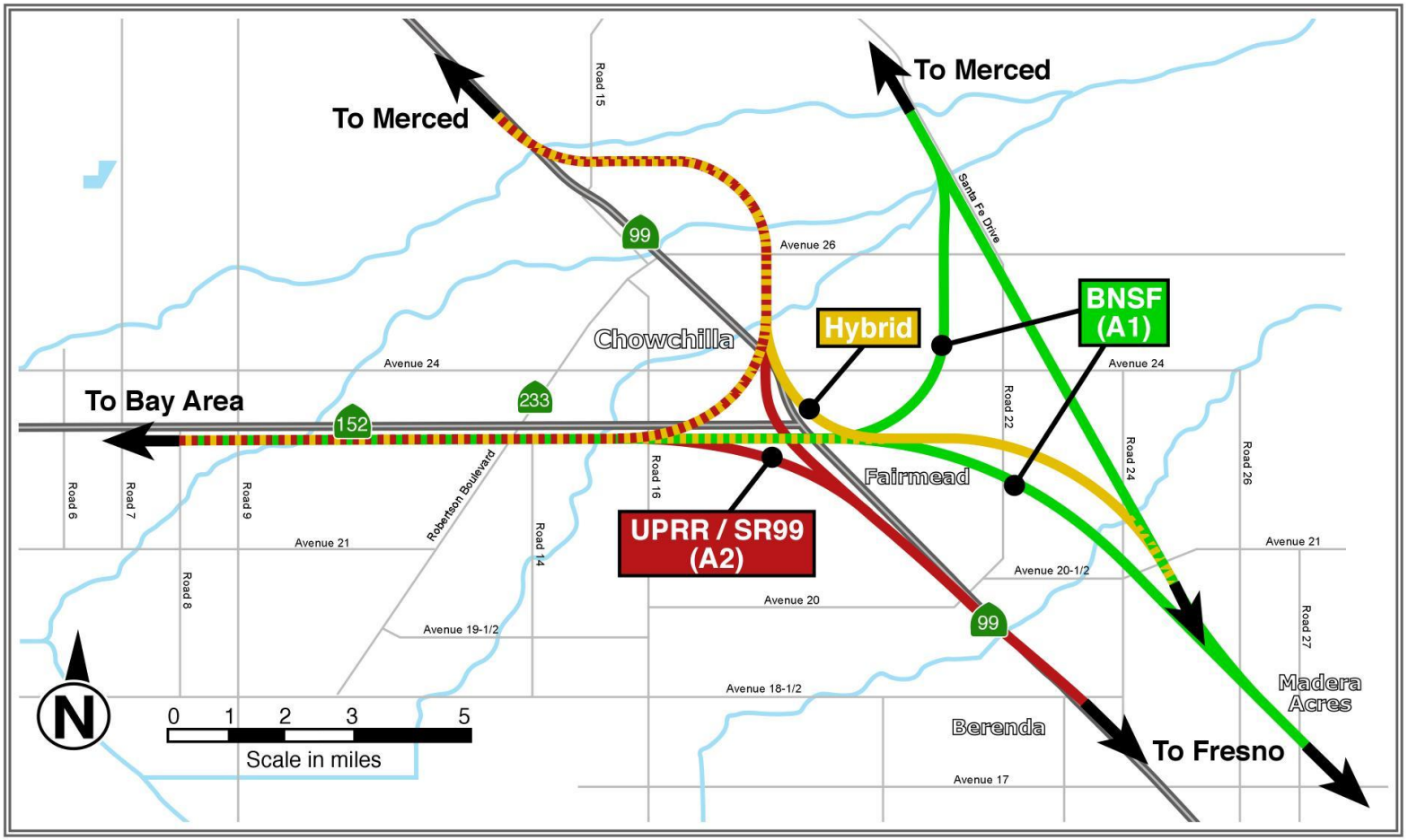
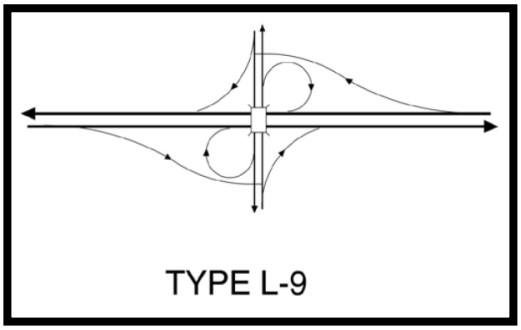


Figure ES-2. Type L-9 Partial Cloverleaf Interchange
(Source: Caltrans HDM, Figure 502.2, Chapter 500)



This HST alignment offset parallel to SR-152 provides roughly 400 feet of separation from each facility's respective right-of-way boundary. The treatment of the property remainder will need to be considered by the Authority, Caltrans, local agencies, and community stakeholders.

If the HST alignment were parallel, and immediately adjacent to SR-152, then the highway would need to be realigned to the north at every interchange location to accommodate the preferred Type L-9 interchange configuration. SR-99 is directly adjacent and parallel to the UPRR through most of the central valley. As the area has developed, SR-99 has had to be realigned at each new interchange. A local example of a realignment to accommodate a new interchange is the SR-99/E. Mission Ave interchange south of Merced. The original location of SR-99 parallel to UPRR is shown in Figure ES-3 and the realigned SR-99 with the new interchange is shown in Figure ES-4. The highway had to be rebuilt for approximately 1.5 miles to achieve a 500-foot offset to accommodate the new interchange (see Figure ES-4). Every new interchange or interchange improvement in the SR-99 corridor adjacent to UPRR has required additional environmental mitigation and thorough coordination between Caltrans, the UPRR, and local agencies.

Frequent highway realignment (every 2 to3 miles per the freeway agreement) to accommodate future improvements would be costly and disruptive. New portions of property would need to be set aside for future interchange improvements, and following Caltrans design standards would require approximately one mile to shift the existing SR-152 to the north to allow for the partial cloverleaf interchange shown in Figure ES-3. In addition, a greater right-of-way width would be required for approximately one-half mile on each side of the overcrossing to contain the ramps, resulting in a three mile long realignment. The approximate amount of additional land that would need to be acquired (above that already owned by Caltrans) would be approximately 85 acres per interchange. Six future interchanges are proposed as per the Freeway agreement: Road 4 (Lincoln Road), Road 6 (Kingwood Road), Road 9 (Hemlock Road), Road 12 (Elm Road), Road 16 (Berenda Way), and Road 17 ½. Due to these interchanges being spaced approximately every two miles, there is insufficient distance to return to SR-152 before it would shift out again for the next interchange. Therefore SR-152 would never completely return to its base alignment until after clearing the last interchange. A more likely scenario would be once SR-152 is shifted out for the first interchange it would be left in the shifted alignment until clearing the last interchange. That would provide a preferred straight alignment instead of a series of curves. Required right of way for that scenario would increase.

Figure ES-3. Aerial of SR-99/E. Mission Ave Interchange Prior to Construction

Figure ES-4. Aerial of SR-99/E. Mission Ave Interchange After Construction

ES.4 RECOMMENDATIONS

It is recommended that the SR-152 alignment and wye configurations shown on Figure ES-1 be carried forward and evaluated in the San Jose to Merced Draft High-Speed Train Project EIR/EIS. The San Jose to Merced HST EIR/EIS will fully evaluate these and the wye configurations contained in the Merced to Fresno Draft High-Speed Train EIR/EIS so that all wye configurations currently under consideration, including the SR-152 alignments, are contained in the San Jose to Merced Draft EIR/EIS.

It is further recommended that the preferred north/south HST alignment for the Merced to Fresno Section be identified by the High-Speed Rail Authority Board following circulation of the Merced to Fresno Draft HST EIR/EIS and a presentation to the Board by Authority staff of a recommended preferred north/south HST alignment.

A decision regarding the preferred east/west connection of the San Jose to Merced Section to the Merced to Fresno Section should take place following circulation of the Draft San Jose to Merced High-Speed Train EIR/EIS and a presentation to the Board by Authority staff of a recommended preferred east/west HST alignment.

San Joaquin Valley Crossing Subsection – Alignments Carried Forward (New Alignments shown in Bold)

- Henry Miller Road to Avenue 24 Alignment Alternative
- Henry Miller Road to Avenue 21 Alignment Alternative
- Henry Miller Road/SR-152/Avenue 21 Alignment Alternative
- **Henry Miller Road to SR-152**

Table ES-1: Alignment Alternatives and Station Location Options Considered

ALIGNMENT ALTERNATIVE/STATION LOCATION AND DESIGN OPTIONS	DECISION		REASONS FOR ELIMINATION*							ENVIRONMENTAL/OTHER CONCERNS
	Carried Forward	Withdrawn	Construction	Incompatibility	Right-of-way	Connectivity/ Accessibility	Revenue/ Ridership	Alignment Eliminated**	Environment	
San Joaquin Valley Crossing Subsection										
Henry Miller Road to Avenue 24 (Revised Program Alignment)	X									Residential displacements; Biological and agricultural resources; Agency concerns
SR-140		X		S					P	Residential/business displacements; Biological, agricultural & parkland resources; Increased travel time
South of GEA		X							P	Biological, agricultural and parkland resources; Residential/business displacements; Results in additional time and distance with resulting costs and impacts
Henry Miller Road to SR-152		X	P							Constructability issues; Residential/business displacements; Biological and agricultural resources; Agency concerns
Henry Miller Road to Avenue 21	X									Residential displacements; Biological and agricultural resources
Henry Miller Road to Avenue 22		X	P						S	Residential displacements; Biological and agricultural resources; Agency concerns
Henry Miller Road/SR-152/ Avenue 21	X									Residential displacements; Biological and agricultural resources.
Henry Miller to SR-152	**X**									Constructability issues; Residential/business displacements; Biological and agricultural resources

Notes: *Reason: Primary (P) and secondary (S) reasons for elimination. **Alignment Eliminated column only applies to station locations. If an alignment is eliminated, a specific station location may no longer be necessary.

1.0 INTRODUCTION/BACKGROUND

1.1 SR-152 WYE BACKGROUND

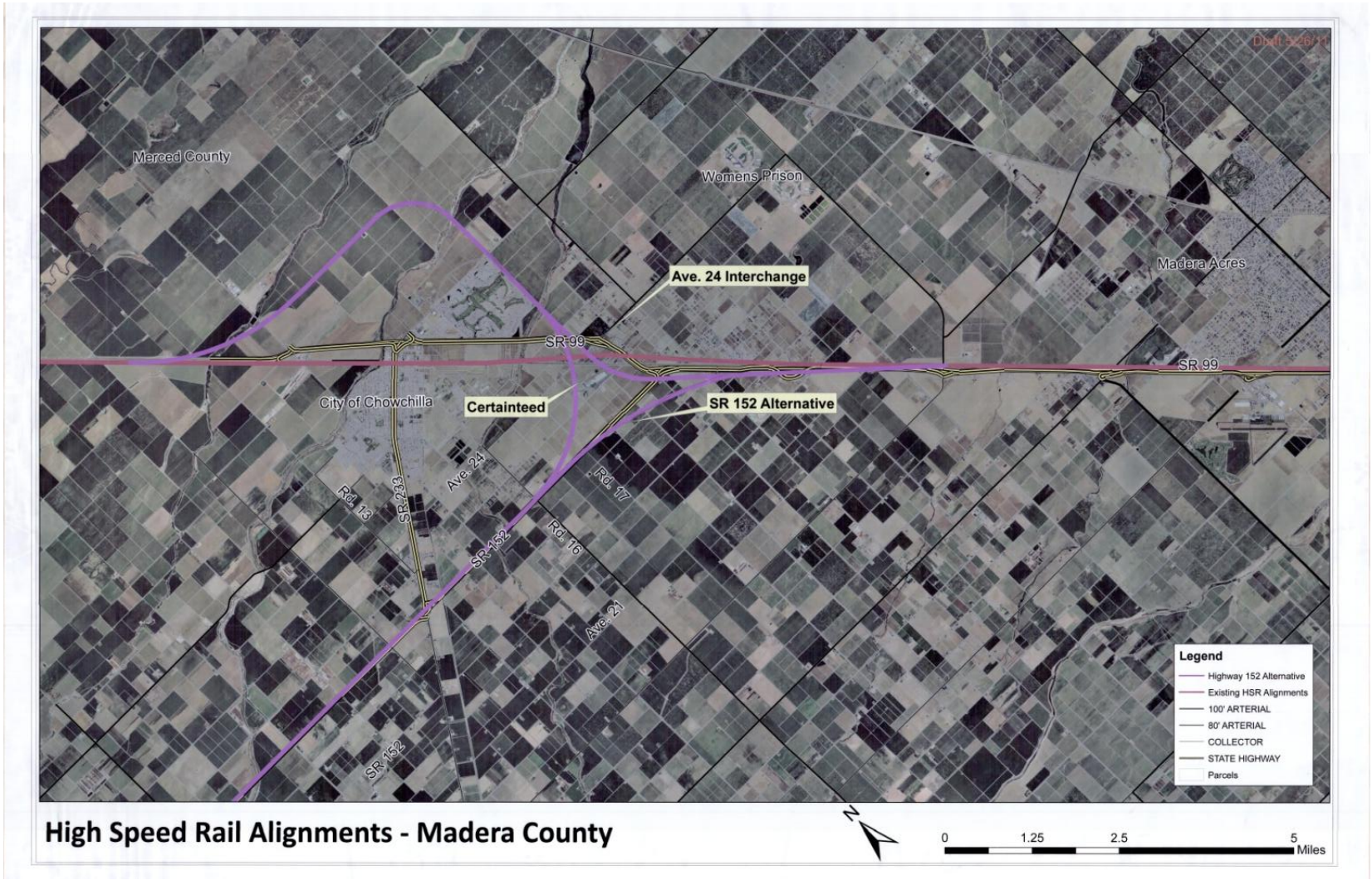
The United States Environmental Protection Agency (USEPA) and United States Army Corps of Engineers (USACE) have requested that the Authority continue to evaluate an HST alignment parallel to State Route 152 (SR-152) in the San Joaquin Valley.

In addition, Authority outreach in the San Joaquin Valley resulted in stakeholders submitting written letters and testifying at High-Speed Rail Authority meetings. Farmers and other stakeholders expressed concern about the impacts that the High-Speed Train (HST) alignment alternatives would have on agricultural land and agricultural business and a farming interest group called "Preserve Our Heritage" (POH) submitted to the Authority a proposal for a new alternative: an alignment paralleling SR-152 with a proposed new location for the wye with the Merced to Fresno Section. Table 1-1 shows recent meetings with POH. Figure 1-1 shows the POH proposed SR-152 alignment.

Table 1-1. Meetings with Preserve Our Heritage Organization

Meeting Date/ Location	Meeting Purpose / Materials
Sept 15, 2010 POH Merced Office	Meeting Purpose: To provide information about the California High-Speed Rail Project and Merced to Fresno Section Preliminary and Supplemental Alternatives Analysis reports, and to listen to POH concerns. Attendance: Brad Samuelson and John Garamendi Jr. from POH and Dick Wenzel of the Merced to Fresno Section Team. Meeting Materials: Merced to Fresno Section Preliminary and Supplemental Alternatives Analysis reports.
Mar 22, 2011 County of Madera offices	Meeting Purpose: Request by POH to listen to their concerns with the current alignments under evaluation. Attendance: Approximately four city staff, and Jeff Abercrombie (Deputy Director at the Authority) and three team members. Meeting Materials: roll out maps.
May 17, 2011 County of Madera offices	Meeting Purpose: Request by POH to listen to their concern with the current alignments under evaluation. Attendance: Jeff Abercrombie from High-Speed Rail Authority and two team members. Meeting Materials: roll out maps.
May 27, 2011 Madera Irrigation District	Meeting Purpose: Discuss SR-152 required Caltrans setbacks for HSR-and to discuss POH's new proposed alternative paralleling SR-152 with north wye leg traversing east of Chowchilla. HSR-Team, POH and Caltrans (telephonically) attended.
June 24, 2011 Madera Irrigation District	Meeting Purpose: Discuss Alternatives Analysis for East-West alignment with SR-152 included in the alternatives. Return POH alternative proposed on May 27, 2011 with revisions made by HSRA Team to make the proposal conform to HSR-design criteria.

Figure 1-1. POH SR-152 High-Speed Rail Alignment & Wye—Madera County



The Authority held several meetings with Caltrans District 6 staff to discuss the appropriate configuration of the proposed HST alignment in relation to possible future configurations of SR-152 and the currently approved freeway agreement between Madera County and Caltrans.

The Authority developed a SR-152 HST alignment to a conceptual level to be consistent with Caltrans planning, the SR-152 Freeway Agreement, and HST engineering criteria. Also, in order to respond to comments from the USACE, three possible wye configurations were developed at the conceptual engineering level to connect to each of the North/South routes under consideration by the Merced to Fresno Section. These include wye configurations from SR-152 to: (1) the A1 Alignment (BNSF), (2) the A2 Alignment (SR-99), and (3) the Hybrid alternative connecting the southern portion of A1 and the northern portion of A2 HST alignments. These three conceptual wye configurations are evaluated and compared in this Alternatives Analysis (AA), and they allow a connection to each of the North/South Merced to Fresno alignments. Figure ES-2 illustrates the wye configurations evaluated in this AA.

1.2 SR-152 FREEWAY AGREEMENT

The existing Freeway Agreement (FA) for SR-152 in Madera County between Caltrans and Madera County documents the understanding between Caltrans and Madera County relating to planned traffic circulation features of future SR-152 improvements. The FA does not bind the State of California to adhere to a particular schedule or staging for construction. Instead, in the event that SR-152 is fully constructed, the FA shows which streets may be closed or connected to SR-152, which streets and roads may be separated from SR-152, the location of frontage roads, and potential relocation, extension, or other modification of streets to maintain traffic circulation in relation to SR-152.

The proposed HST alternatives honor the terms of the existing FA, accommodating the following future types of local access to SR-152:

1. Interchange at SR-59 (border between Merced County and Madera County)
2. Interchange at Co Rd 4 (Lincoln Rd)
3. Closure of Co Rd 5
4. Interchange at Co Rd 6 (Kingwood Rd)
5. Underpass at Co Rd 7 (Juniper Rd), i.e. Co Rd 7 will go over SR-152 with no local access
6. Underpass at Co Rd 8 (Ivy Rd)
7. Interchange at Co Rd 9 (Hemlock Rd)
8. Closure of Co Rd 10 (Guava Rd)
9. Closure of Co Rd 11 (Fig Rd)
10. Interchange at Co Rd 12 (Elm Rd)
11. Underpass at Co Rd 13 (Date Rd)
12. Interchange at SR-233 (Robertson Blvd)
13. Closure of Co Rd 14 N (Wilson Way)

14. Underpass at Co Rd 14½ N (Lincoln Way)

15. Closure of Co Rd 15 N (Sherman)

16. Closure of Co Rd 15½ N (Cleveland Way)

17. Closure of Co Rd 15¾ N

18. Interchange at Co Rd 16 N (Berenda Way)

19. Closure of Co Rd 17 N

20. Interchange at Co Rd 17½ N

21. Closure of Co Rd 18 N

22. Closure of Co Rd 18½ N

23. Interchange at SR-99

If the HST alternatives were to modify any one of the above 23 types of access, with a resulting change in circulation, a new superseding FA would be required to document the changes within Madera County. To supersede an FA on SR-152, a California Environmental Quality Act (CEQA) environmental document approval would be required. The full process is outlined in Chapter 24 of the Caltrans *Project Development Procedures Manual*. A process flowchart is reproduced below (Figure 1-2). Note that Federal Highway Administration (FHWA) involvement is only required on interstates, not on state highways such as SR-152.

1.3 MINIMIZING PROPERTY REMAINDERS BETWEEN HST AND STATE HIGHWAYS

The centerline of the HST alignment is offset approximately 400 feet from the centerline of SR-152. This separation will accommodate future improvements to SR-152 as mentioned in Section 1.2, SR-152 Freeway Agreement. The preferred local interchange configuration is a Type L-9 partial cloverleaf (Figure 1-3). The typical existing corridor land use is agricultural. The average agricultural parcel width adjacent to the SR-152 corridor is 1200 feet.

Figure 1-2. Sequence of Events for Freeway Agreements and Controlled Access Highway Agreements (*Source: Caltrans PDPM, Figure 1, Chapter 24*)

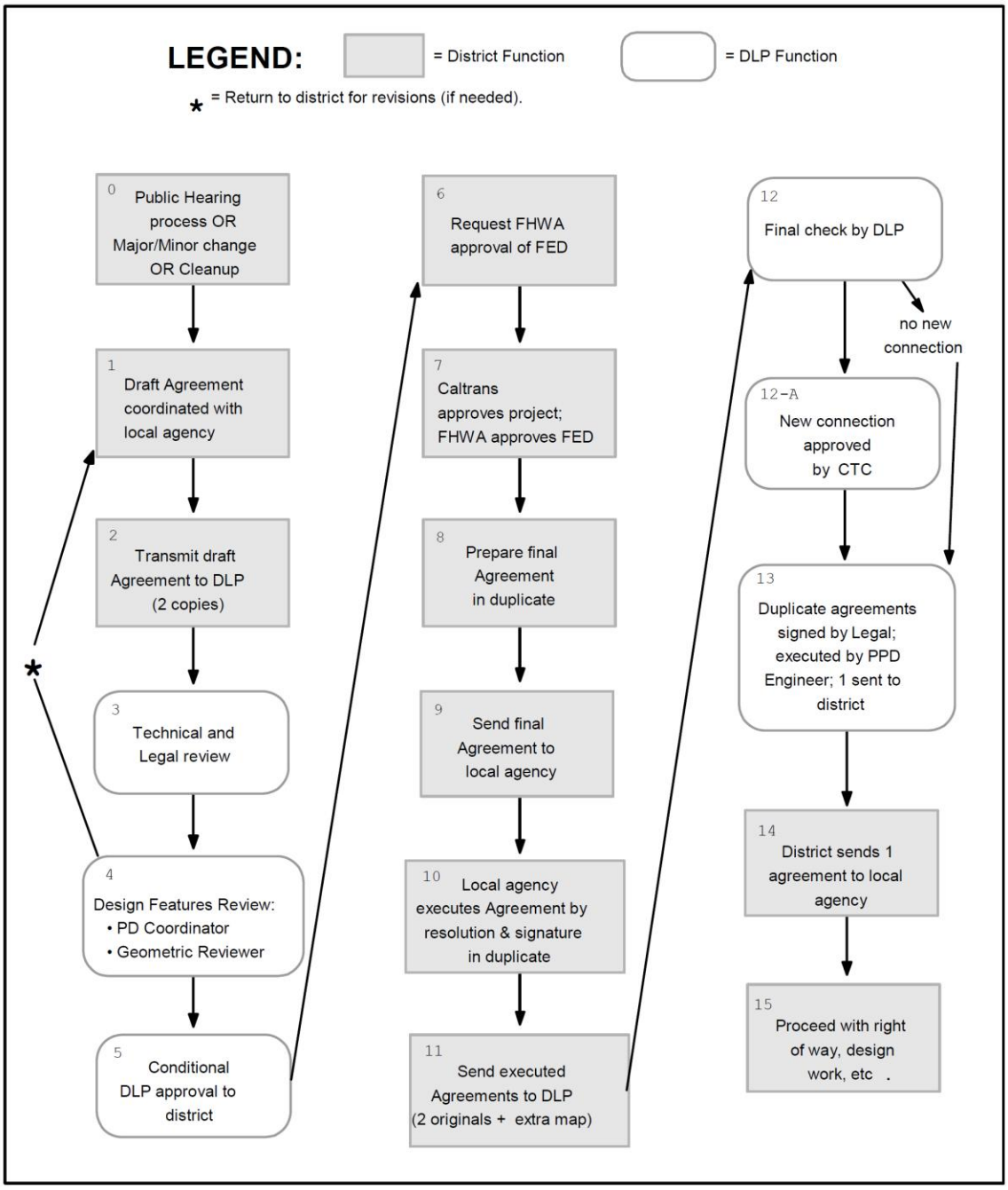
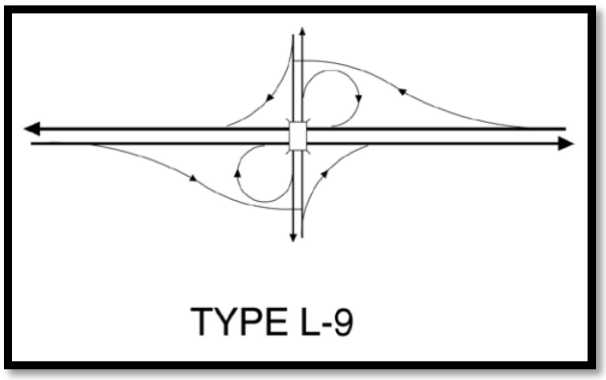


Figure 1-3. Type L-9 Partial Cloverleaf Interchange *(Source: Caltrans HDM, Figure 502.2, Chapter 500)*



This HST alignment offset parallel to SR-152 provides roughly 400 feet of separation from each facility's respective right-of-way boundary. The opportunity resulting from the property remainder will need to be addressed by the Authority, Caltrans, local agencies, and community stakeholders.

If the HST alignment were parallel and immediately adjacent to SR-152, then the highway would need to be realigned to the north at every interchange location to accommodate the preferred Type L-9 interchange configuration. SR-99 is directly adjacent and parallel to the UPRR through most of the central valley. As the area has developed, SR-99 has had to be realigned at each new interchange. A local example of a realignment to accommodate a new interchange is the SR-99/E. Mission Ave interchange south of Merced. The original location of SR-99 parallel to UPRR is shown in Figure 1-4 and the realigned SR-99 with the new interchange is shown in Figure 1-5. The highway had to be rebuilt for approximately 1.5 miles to achieve a 500-foot offset to accommodate the new interchange (see Figure 1-5). Every new interchange or interchange improvement in the SR-99 corridor adjacent to UPRR has required additional environmental mitigation and thorough coordination between Caltrans, the UPRR, and local agencies.

Frequent highway realignment (every 2 to3 miles per the freeway agreement) to accommodate future improvements would be costly and disruptive. New portions of property would need to be set aside for future interchange improvements, and following Caltrans design standards would require approximately one mile to shift the existing SR-152 to the north to allow for the partial cloverleaf interchange shown in Figure 1-3. In addition, a greater right-of-way width would be required for approximately one-half mile on each side of the overcrossing to contain the ramps, resulting in a three mile long realignment. The approximate amount of additional land that would need to be acquired (above that already owned by Caltrans) would be approximately 85 acres per interchange. Six future interchanges are proposed as per the Freeway agreement: Road 4 (Lincoln Road), Road 6 (Kingwood Road), Road 9 (Hemlock Road), Road 12 (Elm Road), Road 16 (Berenda Way), and Road 17 ½. Due to these interchanges being spaced every approximately two miles, there is insufficient distance to return to SR-152 before it would shift out again for the next interchange. Therefore SR-152 would never completely return to its base alignment until after clearing the last interchange. A more likely scenario would be once SR-152 is shifted out for the first interchange it would be left in the shifted alignment until clearing the last

interchange. That would provide a preferred straight alignment instead of a series of curves. Required right of way for that scenario would increase.

Figure 1-4. Aerial of SR-99/E. Mission Ave Interchange Prior to Construction

Figure 1-5. Aerial of SR-99/E. Mission Ave Interchange After Construction

The proposed HST alignment offset 400 feet parallel to SR-152 balances the needs of 1) the Authority to have a safe operating corridor, 2) Caltrans ability to accommodate future growth, and 3) minimizes the impacts to land owners, Caltrans, and the County. HST alignments closer than 500 feet to SR-152 incur greater impacts to Caltrans and local agency facilities. HST alignments further than 400 feet from SR-152 do not honor the Authority's goal of remaining within existing transportation corridors and further bifurcate the predominantly agricultural parcels adjacent to SR-152 and HST.

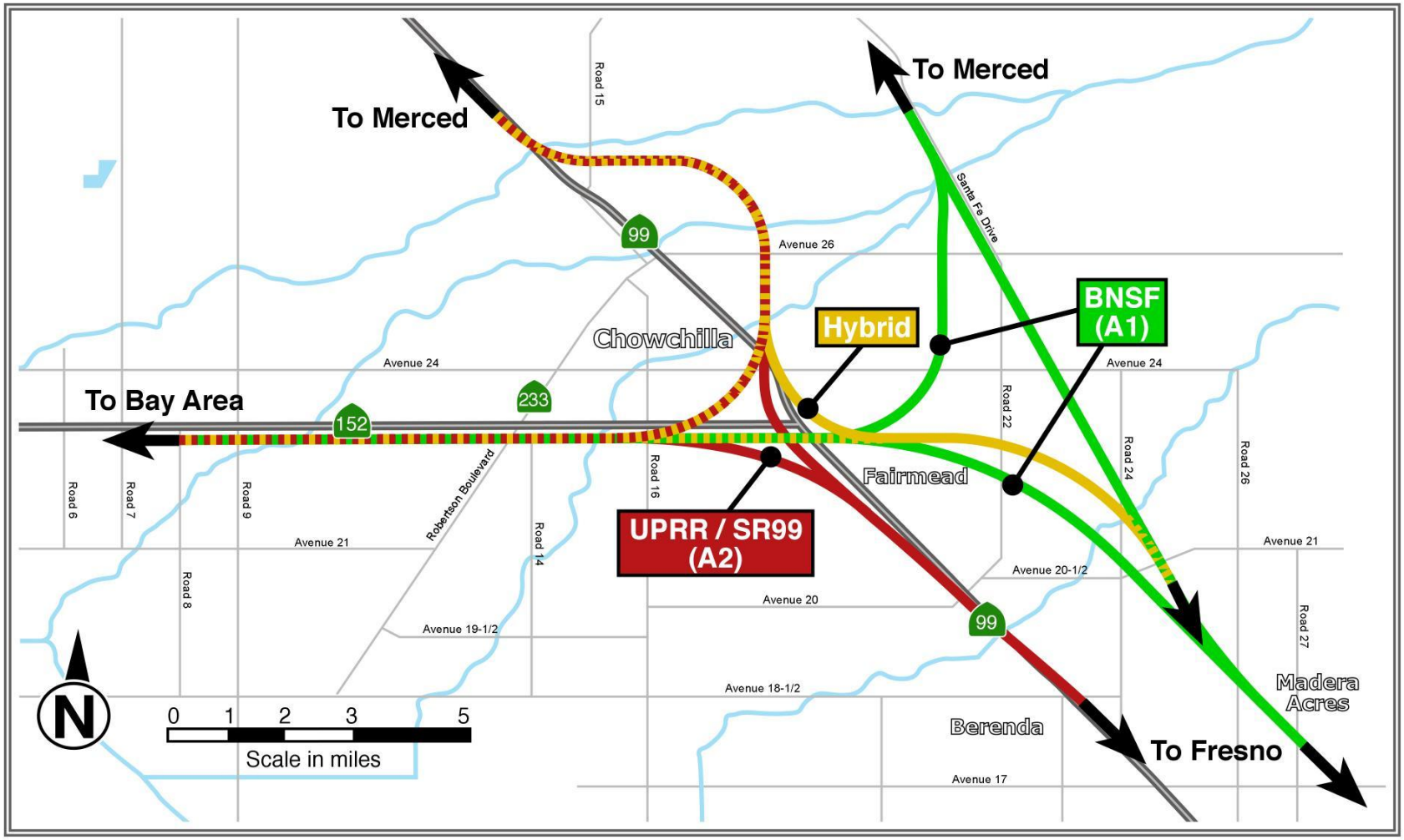
2.0 SR-152 WYE ALTERNATIVES DESCRIPTION

2.1 STUDY AREA

The HST System lines to the Bay Area, Merced (eventually Sacramento) and Southern California meet in the San Joaquin Valley, in the vicinity of the City of Chowchilla, via a railroad wye connection. A wye is where train tracks branch off a mainline to continue in different directions, forming a "Y"-like formation. From each direction, two tracks must become four tracks. The two pairs of tracks split in two directions, each toward another pair of tracks from the other corners of the wye.

The SR-152 Wye study area is in northern Madera County, near the City of Chowchilla and community of Fairmead. A portion of one wye alternative would extend into southern Merced County, along SR-99. The wye is a junction between three HST lines, allowing trains from the west (San Jose/Gilroy and San Francisco Bay Area), north (Merced and Sacramento) and south (Fresno and Southern California) to pass in any direction. The wyes all connect to a common east-west alignment which follows SR-152 and Henry Miller Road between the community of Volta in western Merced County and Chowchilla in northern Madera County. Three alternative wyes provide connections to three north-south HST alternatives which follow UPRR/SR-99 and BNSF (or a combination of each) between Merced and Fresno. The three wye alternatives are: SR-152 Wye to BNSF (A1); SR-152 Wye to UPRR (A2); and SR-152 Wye to Hybrid, as shown below in Figure 2-1.

Figure 2-1. SR-152 Wye Alternatives



The limits of the SR-152 Wye study area are: Road 8 to the west for all alternatives; the Chowchilla River to the north for all alternatives; and to the south, just south of Avenue 20-1/2 for the BNSF (A1) and the Hybrid; and just south of Avenue 18-1/2 for the UPRR (A2).

2.2 SR-152 WYE TO BNSF ALTERNATIVE (A1)

2.2.1 SR-152 to Wye

Beginning 400 feet south of SR-152 at Road 8, the two-track HST SR-152 Wye to BNSF Alternative would begin parallel to the existing expressway. It would be offset from the highway to allow interchange construction when SR-152 is converted to a full freeway. Highway interchanges are planned approximately every 2 to 3 miles: Road 9 (Hemlock Road); Road 12 (Elm Road); SR-233 (Robertson Boulevard); Road 16 N (Berenda Way); and Road 17-1/2 N. The 400-foot offset would keep the HST alignment from affecting the interchanges.

The HST wye alternative would pass through agricultural lands consisting of both field crops and orchards. At Road 9, the alignment would pass through a group of agricultural buildings. Continuing east, parallel to SR-152, it would pass over Ash Slough on a bridge. At Robertson Boulevard, it would pass just to the south of the existing interchange.

Continuing parallel to SR-152, just east of Road 18, the two-track alignment would expand to a four-track alignment. This location would be the western limits of the wye for the SR-152 Wye to BNSF Alternative. Approaching SR-99 and the UPRR, the four tracks would ascend to aerial structures. The wye alternative would pass over Road 19, SR-99, the UPRR and Fairmead Boulevard into the community of Fairmead. Three of the four tracks would descend back to grade, while the fourth track, the southernmost, would continue on an aerial structure. The HST alignment would pass through properties currently occupied by homes and the Fairmead Elementary School. At this location, the alignment would split—the two center tracks would turn south and the outside tracks would turn north. The southernmost track would cross over the two center tracks on an aerial structure and descend to join the other outside track at-grade.

2.2.2 South Leg Wye - Bay Area/SR-152 to BNSF South

The south leg of the wye connecting the Bay Area/SR-152 to the BNSF South would be the mainline leg of the wye. The trains would travel the straight path at full speed through the switches at both sides of the wye. At Fairmead, the south leg would turn away from the north leg and run at-grade, passing though land currently occupied by orchards and fields with row crops. Some intersecting roads would pass over the HST, while others would be closed. New frontage roads would be developed to provide access to parcels where road closures affect existing access. The HST wye alternative would cross Berenda Creek on a bridge as it continues to curve. Road 24 and Avenue 21 would pass over the HST. At Dry Creek, the HST would ascend to an aerial structure to pass over the creek. The HST would remain on an aerial structure as it meets the BNSF railway at the north side of the community of Madera Acres. The HST would run immediately parallel to the west side of the BNSF right-of-way, remaining on aerial structure through Madera Acres. This would require the acquisition of the properties immediately adjacent to the west of the BNSF, the great majority of which are residential. The alignment would end as the HST returns to grade, just east of Lake Street, meeting the east leg of the wye.

2.2.3 North Leg Wye - Bay Area/SR-152 to BNSF North

The north leg of the wye would connect the Bay Area/SR-152 to the BNSF North. At the west junction of the wye, diverging switches would require the trains to slow from top speed. This would occur again as they join the east leg of the wye. As the HST alignment leaves the south leg of the wye in Fairmead, it would run at-grade and turn north, passing through land currently occupied by orchards and fields of row crops. Some intersecting roads would pass over the HST, while others would be closed. New frontage roads would provide access to parcels where road closures affect existing access. Near Avenue 25, the HST would align with Road 21. The HST tracks would replace the roadway with a realigned Road 21 following alongside the east side of the HST right-of-way from south of Avenue 25 to Avenue 26. Avenue 25 and Avenue 26 would both pass over the HST. The HST would pass over Berenda Slough on a bridge and would begin to turn slightly to the west. The easternmost track would ascend to an elevated alignment to pass over Ash Slough and the two tracks of the east leg of the wye. The westernmost track would pass over Ash Slough on a low bridge and meet the two tracks of the east leg of the wye at grade. The four HST tracks would align parallel and immediately adjacent to the BNSF right-of-way. The alignment would end just north of Avenue 28, just before the Chowchilla River, where the two outside tracks would join the two inside tracks, returning the HST to a two-track configuration.

2.2.4 East Leg Wye - BNSF South to BNSF North

The east leg of the wye would connect the BNSF South to the BNSF North. At the south junction of the wye, diverging switches would require the trains to slow from top speed. The trains would run though the north junction without needing to slow. The east leg of the wye would begin in the community of Madera Acres, where the two HST tracks would split to four tracks south of Road 26. The two tracks for the south leg of the wye would run north on an aerial structure, while the two tracks leading to the east leg of the wye would run at-grade. The two tracks of the east leg would turn to the north, crossing Dry Creek on a bridge. The HST would run at-grade, immediately adjacent to the west of BNSF's right-of-way. Some intersecting roads would pass over the HST and BNSF, while others would be closed. New frontage roads would provide access to parcels where road closures affect existing access. After passing over Berenda Slough on a bridge, the easternmost track of the north leg of the wye would pass over the two tracks of the east leg. The westernmost track would meet the two tracks of the east leg of the wye at grade. The alignment would end just north of Avenue 28, just before the Chowchilla River, where the two outside tracks would join the two inside tracks, returning the HST to a two-track configuration.

2.3 SR-152 WYE TO UPRR ALTERNATIVE (A2)

2.3.1 SR-152 to Wye

Beginning 400 feet south of SR-152 at Road 8, the two-track HST SR-152 Wye to UPRR Alternative would be parallel to the existing expressway. It would be offset from the highway to allow interchange construction when SR-152 is converted to a full freeway. Highway interchanges are planned approximately every 2 to 3 miles: Road 9 (Hemlock Road); Road 12 (Elm Road); and

SR-233 (Robertson Boulevard). The 400-foot offset would keep the HST alignment from affecting the interchanges.

The HST wye alternative would pass through agricultural lands consisting of both field crops and orchards. At Road 9, the alignment would pass through a group of agricultural buildings. Continuing east, parallel to SR-152, it would pass over Ash Slough on a bridge. At Robertson Boulevard, it would pass just to the south of the existing interchange.

Continuing parallel to SR-152, just east of Road 14, the two-track alignment would expand to a four-track alignment. This location would be the western limits of the wye for the SR-152 Wye to BNSF Alternative. After the four tracks pass over Berenda Slough on parallel bridges, the two outside tracks would ascend to aerial structures. The southernmost track would pass over the two center tracks as it turns north. The northernmost track would ascend to join the southern track as both tracks cross over SR-152 on an aerial structure.

2.3.2 South Leg Wye - Bay Area/SR-152 to UPRR South

The south leg of the wye connecting the Bay Area/SR-152 to the BNSF South would be the mainline leg of the wye. This means that the trains would take the straight path at full speed through the switches at both sides of the wye. The south leg would begin to turn away from SR-152 near Road 16. The HST would run at-grade, passing though orchards and some fields with row crops. Some intersecting roads would pass over the HST, while others would be closed. New frontage roads would be built to provide access to parcels cut-off by road closures. The wye alternative would ascend to cross over Avenue 21-1/2, where it would meet the east leg of the wye.

2.3.3 Wye to Madera

The east leg of the wye would meet the south leg at Avenue 21-1/2. The westernmost tracks of the east leg would pass over the two tracks of the south leg, while the other track of the east leg would approach at the same grade as the south leg. All four tracks would pass over Avenue 21-1/2 just west of the SR-99 interchange. Just south of the crossing, the four tracks would combine back to two. The two tracks would run on an elevated berm passing over Golden State Boulevard before another short section of berm at the SR-99 interchange with Road 20. Beginning just north of the Road 20 interchange, the HST would ascend to an aerial structure that would pass over the interchange and continue elevated to pass over SR-99 and the UPRR at a shallow angle. This crossing would require a number of straddle-bents to cross both the freeway and railroad. The HST would not be east of the UPRR right-of-way until Avenue 18-1/2. The alignment would end just south of Avenue 18-1/2, north of Madera.

2.3.4 North Leg Wye - Bay Area/SR-152 to UPRR North

The north leg of the wye would connect the Bay Area/SR-152 to the UPRR North. At the west junction of the wye, diverging switches would require trains to slow from top speed. This slow down would occur again as trains reach the east leg of the wye. The HST alignment continuing from the south leg of the wye would be elevated and would cross over SR-152. The alignment would curve to the north and would run on an elevated berm. The HST would pass over Avenue 23-1/2, Road 17-1/2, Avenue 24, Chowchilla Boulevard, SR-99, the UPRR, and Avenue 24-1/2

before meeting the east leg of the wye at Ash Slough. New frontage roads would be built to provide access for parcels cut-off by road closures.

2.3.5 Wye to North

The north and east legs of the wye would meet at Ash Slough, where they would run due north. The easternmost track of the north wye would pass over the two tracks of the east wye, while the westernmost track of the north leg would meet the tracks of the east wye at the same grade. All four tracks would pass over the Chowchilla River on bridges and would descend to run at-grade just east of Golf Drive West. Before Avenue 26, the four tracks would combine back to two. After crossing Avenue 26, the HST alignment would begin to turn west, crossing fields of row crops. The HST alignment would continue over a bridge across the Chowchilla River. The HST would run due west for a short distance 0.5 mile north of Avenue 27. At South Minturn Road, the HST would turn north. It would ascend to an aerial structure to cross Dutchman Creek, SR-99, and the UPRR. It would descend to run at-grade immediately west of the UPRR right-of-way. The alignment would end just north of the Chowchilla River, opposite the California Highway Patrol Inspection Facility on SR-99.

2.3.6 East Leg Wye - UPRR South to UPRR North

The east leg of the wye would connect the UPRR South to UPRR North, passing through open fields interspersed with row crops and orchards. At the south junction of the wye, diverging switches would require trains to slow from top speed. As the HST alignment leaves the south leg of the wye, it would run on an elevated berm. Curving north, the alignment would cross over Road 19, return to a berm, and then ascend to an elevated structure to cross Road 18-1/2, Road 18, SR-152, Avenue 23-1/2, a UPRR industrial spur track, the UPRR mainline, and Chowchilla Boulevard. The alignment would return to a berm, cross over Avenue 24, SR-99, and Avenue 24-1/2 before meeting the north leg of the wye at Ash Slough.

2.4 SR-152 WYE TO HYBRID ALTERNATIVE

2.4.1 SR-152 to Wye

Beginning 400 feet south of SR-152 at Road 8, the two-track HST SR-152 Wye to Hybrid Alternative would be parallel to the existing expressway. It would be offset from the highway to allow interchange construction when SR-152 is converted to a full freeway. Highway interchanges are planned approximately every 2 to 3 miles: Road 9 (Hemlock Road); Road 12 (Elm Road); and SR-233 (Robertson Boulevard). The 400-foot offset would keep the HST alignment from affecting the interchanges.

The HST alignment would pass through agricultural lands consisting of both field crops and orchards. At Road 9, the alignment would pass through a group of agricultural buildings. Continuing east, parallel to SR-152, the alignment would cross Ash Slough on a bridge. At Robertson Boulevard, the alignment would pass just to the south of the existing interchange.

Continuing parallel to SR-152, just east of Road 14, the two-track alignment would expand to a four-track alignment. This location would be the western limit of the wye for the SR-152 Wye to Hybrid Alternative. After the four tracks pass over Berenda Slough on parallel bridges, the two

outside tracks would ascend to aerial structures. The southernmost track would pass over the two center tracks as the alignment turns north. The northernmost track would ascend to join the southern track as both tracks cross over SR-152 on an aerial structure.

2.4.2 South Leg Wye—Bay Area/SR-152 to BNSF South

The south leg of the wye connecting the Bay Area/SR-152 to the BNSF South would be the mainline leg of the wye. This means that the trains would travel the straight path at full speed through the switches at both sides of the wye. Beginning near Road 16, the south leg would remain parallel to SR-152, with Road 16 and 17-1/2 passing over the HST. The HST would then ascend to an aerial structure and cross over Road 19, SR-99, the UPRR, and Fairmead Boulevard. At the community of Fairmead, the HST would descend back to grade, passing through a number of lands currently occupied by homes and the Fairmead Elementary School. East of the school, the alignment would meet the east leg of the wye. Here, the westernmost track of the east leg would pass over the two mainline tracks of the south leg, while the easternmost track of the east leg would meet the south leg at-grade.

2.4.3 East Leg Wye—BNSF South to UPRR North

The east leg of the wye would connect the BNSF South to the UPRR North, passing through the community of Fairmead. At the south junction of the wye, just east of Fairmead Elementary School, diverging switches would require trains to slow from top speed. The southernmost track would ascend to an aerial structure to cross over the two center tracks. The northernmost track curves to join the southern track as they both curve north, ascending to an aerial structure over Avenue 24, and then back over SR-99 again. Descending to grade, the HST would pass over Ash Slough on a bridge. The alignment would meet the north leg of the wye just north of the slough.

2.4.4 Wye to BNSF South

East from the wye, the four HST tracks run due east, with the two outermost tracks combining with the center tracks, marking the end of the wye. East of Road 20-1/2, the two HST tracks would run at grade, passing though lands currently occupied by orchards and row crop fields. Some intersecting roads would pass over the HST and others would be are closed. New frontage roads would be built to provide access to parcels cut-off by road closures. The HST would cross Berenda Creek on a bridge as it continues to curve. The HST would meet the BNSF at Avenue 21, where Avenue 21 passes over both the BNSF and HST. The HST would run immediately parallel and adjacent to the west side of the BNSF right-of-way. The alignment would end just north of Dry Creek and south of Avenue 20-1/2.

3.0 EVALUATION OF SR-152 WYE ALTERNATIVES

The maximum difference in the length of the wye alternatives is 6.95 miles. Differences in costs were largely dependent on the amount of elevated track required. However, the wye designs are preliminary and therefore the amount of elevated and at-grade track is not fully determined for these alternatives.

Table 3-1 summarizes the cost and impacts of the SR-152 Wye Alternatives. Table 3-2 summarizes journey times of the SR-152 Wye Alternatives.

Table 3-1. Comparison of State Route 152 Wye Alternatives

Category	Measurement[a]	SR-152 Wye to BNSF (A1)	SR-152 Wye to UPRR (A2)	SR-152 Wye to Hybrid
Design Objectives	Journey time (minutes)	SEE TABLE 3-2	SEE TABLE 3-2	SEE TABLE 3-2
	Route length (miles)	39.75	32.8	33.1
	at-grade/ embankment	35.5	25.3	29.8
	retained fill	0	0	0
	Elevated	4.25	7.5	3.3
	miles of curvature	10.6	15.0	15.8
	Intermodal connections	Not applicable (station measure only)		
	Operating & Maintenance Costs	High	High	High
	Capital Cost Factor	1.43	1.13	1.00
Land Use	Potential for TOD	Not applicable (station measure only)		
	Consistency with other planning efforts	Neutral – land use plans do not support or conflict with alternatives; supported by Draft City of Chowchilla General Plan		
Constructability	Constructability (complexity of construction)	Very High	High	High
	Disruption to existing railroads (number of crossings of railroad right-of-way)	2	3	2
	Disruption to and relocation of utilities (miles of alternative in urban areas)	2	1	1
	Number of crossings of UPRR/ BNSF/ SR-152/ SR-99	3	8	7
	# SR-152 crossings	0	2	1
	# SR-99 crossings	1	3	4
	# UPRR crossings	1	3	2
	# BNSF crossings	1	0	0
Disruption to Communities	Total property within right-of-way (acres)	452	333	373
	Agricultural (acres)[b]	411	300	340
	Commercial (acres)	2	8	1

Category	Measurement[a]	SR-152 Wye to BNSF (A1)	SR-152 Wye to UPRR (A2)	SR-152 Wye to Hybrid
	Industrial (acres)	0.2	9	4
	Residential (acres)	26	13	19
	Other (acres)	12	3	8
	Properties with access affected (number of road closures)	20	15	20
	Local traffic effects around stations (number of roads with decreased LOS)	Not applicable (station measure only)		
	Local traffic effects at grade separations (number of grade separations)	23	12	15
Environmental Resources	Biological Resources - number of new bridge crossings	11	5	2
	Biological resources - acres of wetlands	3.7	1.3	1.6
	Biological resources - linear feet of waterways crossed	991	725	722
	Biological resources - acres of potential T&E habitat	70	25	49
	Cultural Resources (number of sites)	1	1	1
	Parklands (number of parks)	0	0	0
	Agricultural lands (acres of prime, unique, and important farmland)[b]	333	267	293
Natural Environment	Noise and Vibration	High amount of residential land use	Low amount of residential land use	Medium amount of residential land use
	Visual/scenic resources (miles of alternative in urban areas)	2.1	0.1	0.1
	Geotechnical constraints	Does not differentiate among alternatives		
	Hazardous Materials (number of sites)	1	2	1

[a] Totals may not equal sum of subtotals due to rounding differences.

[b] The differences between affected acres of agricultural land use(City/County data) and prime, unique, and important farmland (California Department of Conservation) is due to the difference in the source and how they define agricultural land use.

T&E = Threatened and Endangered

Table 3-2. Comparison of Journey Times for State Route 152 Wye Alternatives

Operating Speed	Route	Journey Times (minutes)		
		SR-152 to BNSF (A1)	SR-152 to UPRR (A2)	SR-152 to Hybrid
220 mph	San Jose to Fresno Wye	5	5	5.4
150 mph	San Jose to Merced Wye	7.6	7.5	7.5
150/220 mph	Merced to Fresno Wye	6.3	5.7	6

3.1 SR-152 WYE TO BNSF ALTERNATIVE (A1)

The SR-152 Wye to BNSF Alternative would be constructed primarily at-grade and would require fewer miles of curvature as compared to the SR-152 Wye to UPRR and SR-152 Wye to Hybrid alternatives. It would be the longest in length and have the highest operational costs of the three alternatives. This wye alternative would result in the slowest travel time between Merced and Fresno and San Jose to Merced. The SR-152 Wye to BNSF Alternative would be constructed the furthest distance from SR-99; therefore, it would be the most complex alternative to construct. Construction costs would be 43% greater than the SR-152 Wye to Hybrid Alternative and 25% greater than the SR-152 Wye to UPRR Alternative. The SR-152 Wye to BNSF Alternative would require the greatest number of grade separations. It would result in the least disturbance to existing railroads and existing transportation corridors.

SR-152 Wye to BNSF Alternative would result in the highest impacts to residential and agricultural properties, including important farmlands. Due to its proximity to residential properties in the Fairmead and Madera Acres communities, this alternative would result in greater noise and vibration impacts as compared to the SR-152 Wye to UPRR and SR-152 Wye to Hybrid alternatives. Visual impacts would also be greater under this alternative. The SR-152 Wye to BNSF Alternative would result in more water crossings and higher impacts to wetlands and threatened and endangered habitat as compared to the other two wye alternatives.

3.2 SR-152 WYE TO UPRR ALTERNATIVE (A2)

The SR-152 Wye to UPRR Alternative is the shortest of the three alternatives and would provide the best travel time between Merced and Fresno. It would have the greatest mileage distance of elevated structures as compared to the SR-152 Wye to BNSF and SR-152 Wye to Hybrid alternatives. The SR-152 Wye to UPRR Alternative would have fewer grade separations as compared to the other two alternatives. It would require the greatest number of overall existing transportation corridor crossings. Due to its proximity to SR-99 and UPRR crossings, this alternative would result in a high level of complexity during construction.

The SR-152 Wye to UPRR Alternative would offer environmental advantages over the other two alternatives. It would have the fewest impacts of all alternatives to private property acquisition, potential threatened and endangered species habitat, wetlands, and prime and important

farmlands. It would also have the least impact on sensitive noise and vibration receptors as compared to the other two wye alternatives.

3.3 SR-152 WYE TO HYBRID ALTERNATIVE

The SR-152 Wye to Hybrid Alternative would have the lowest capital cost factor due to the shortest mileage distance of elevated structures. It would require the greatest curvature mileage as compared to the two other alternatives; consequently, it would result in the second slowest travel time between Merced and Fresno. The SR-152 Wye to Hybrid Alternative would require complex construction over SR-99.

As compared to the SR-152 Wye to UPRR Alternative, the SR-152 Wye to Hybrid Alternative would result in more impacts to private property, potential threatened and endangered species habitat, wetlands, prime and important farmland agricultural, and noise and vibration sensitive receptors. It would have fewer impacts to private property and environmental resources than the SR-152 Wye to BNSF Alternative.

4.0 RECOMMENDATIONS

It is recommended that the 152 alignment and wye configurations shown on Figure 2-1 be carried forward and evaluated in the San Jose to Merced Draft High-Speed Train EIR/EIS. The San Jose to Merced HST EIR/EIS will fully evaluate these and the wye configurations contained in the Merced to Fresno Draft High-Speed Train EIR/EIS so that all wye configurations currently under consideration, including the SR-152 alignments, are contained in the San Jose to Merced Draft EIR/EIS.

It is further recommended that the preferred north/south HST alignment for the Merced to Fresno Section be identified by the High-Speed Rail Authority Board following circulation of the Merced to Fresno Draft EIR/EIS and a presentation to the Board by Authority staff of a recommended preferred north/south HST alignment.

A decision regarding the preferred east/west connection of the San Jose to Merced Section to the Merced to Fresno Section should take place following circulation of the Draft San Jose to Merced High-Speed Train EIR/EIS and a presentation to the Board by Authority staff of a recommended preferred east/west HST alignment.

San Joaquin Valley Crossing Subsection – Alignments Carried Forward (New Alignments shown in Bold)

- Henry Miller Road to Avenue 24 Alignment Alternative
- Henry Miller Road to Avenue 21 Alignment Alternative
- Henry Miller Road/SR152/Avenue 21 Alignment Alternative
- **Henry Miller Road to SR-152**

Table 4-1: Alignment Alternatives and Station Location Options Considered

ALIGNMENT ALTERNATIVE/STATION LOCATION AND DESIGN OPTIONS	DECISION		REASONS FOR ELIMINATION*							ENVIRONMENTAL/OTHER CONCERNS
	Carried Forward	Withdrawn	Construction	Incompatibility	Right-of-way	Connectivity/ Accessibility	Revenue/ Ridership	Alignment Eliminated**	Environment	
San Joaquin Valley Crossing Subsection										
Henry Miller Road to Avenue 24 (Revised Program Alignment)	X									Residential displacements; Biological and agricultural resources; Agency concerns
SR-140		X		S					P	Residential/business displacements; Biological, agricultural & parkland resources; Increased travel time
South of GEA		X							P	Biological, agricultural and parkland resources; Residential/business displacements; Results in additional time and distance with resulting costs and impacts
Henry Miller Road to SR-152		X	P							Constructability issues; Residential/business displacements; Biological and agricultural resources; Agency concerns
Henry Miller Road to Avenue 21	X									Residential displacements; Biological and agricultural resources
Henry Miller Road to Avenue 22		X	P						S	Residential displacements; Biological and agricultural resources; Agency concerns
Henry Miller Road/SR-152/ Avenue 21	X									Residential displacements; Biological and agricultural resources.
Henry Miller to SR-152	**X**									Constructability issues; Residential/business displacements; Biological and agricultural resources

Notes: *Reason: Primary (P) and secondary (S) reasons for elimination. **Alignment Eliminated column only applies to station locations. If an alignment is eliminated, a specific station location may no longer be necessary.